Music to Encipher By --- Why might U.S. postal censors have been humming while they worked? September 24

Music and cryptanalysis: the relationship between these two disciplines -–each a combination of art and science – has long been pondered within the halls of the Agency. Sometimes the connection seems intangible and mysterious. And sometimes, as we're about to see, the relationship is rather more concrete.

During World War II, civilian postal censors examined mail for any hints that all might not be as it appeared. If any censor had doubts about a letter, it would then be passed along to cryptanalysts for further study. Being the first line of defense, the censors were trained in what to watch out for. The *Censorship Manual "Cryptanalytic"* of June 1945 guided the censors through various categories of enciphered messages, secondary meanings, and hidden or camouflaged cipher that they might expect to encounter.

Among the manual's examples of a camouflaged cipher appears a musical score. The writing is for a treble non-transposing instrument (think violin, for example) over a piano accompaniment. This complex layout gives a sense of authenticity that a single instrumental line might not have. The notation is correct and is written with an experienced hand, without any of the elementary mistakes or awkwardness of a musical novice. Beyond these basics, there are the expected performance markings (tempo, dynamics). And finally, the music itself, although perhaps not inspiring enough to make anybody's Top Ten list, is believable: it could certainly be performed by a treble instrument and a piano.

So what is the trick here? If there is a message, how is it concealed? For many analysts with a musical background, the initial thought would be to look at the note names, to see if words have somehow been "spelled." Master composers have used this technique to devise themes in their compositions, after all, ("B-A-C-H," for example), so this would be a reasonable starting point.

Reasonable, but wrong. The *Censorship Manual* explains that the answer lies not in note names, but in note *durations*, as the basis of the hidden message. The

composer, or should we now say cryptographer, divided notes into long and short values. These then became the dots and dashes of Morse code. Bar lines, rests, and slurs were used to clearly show beginnings and endings of individual characters.

(U)
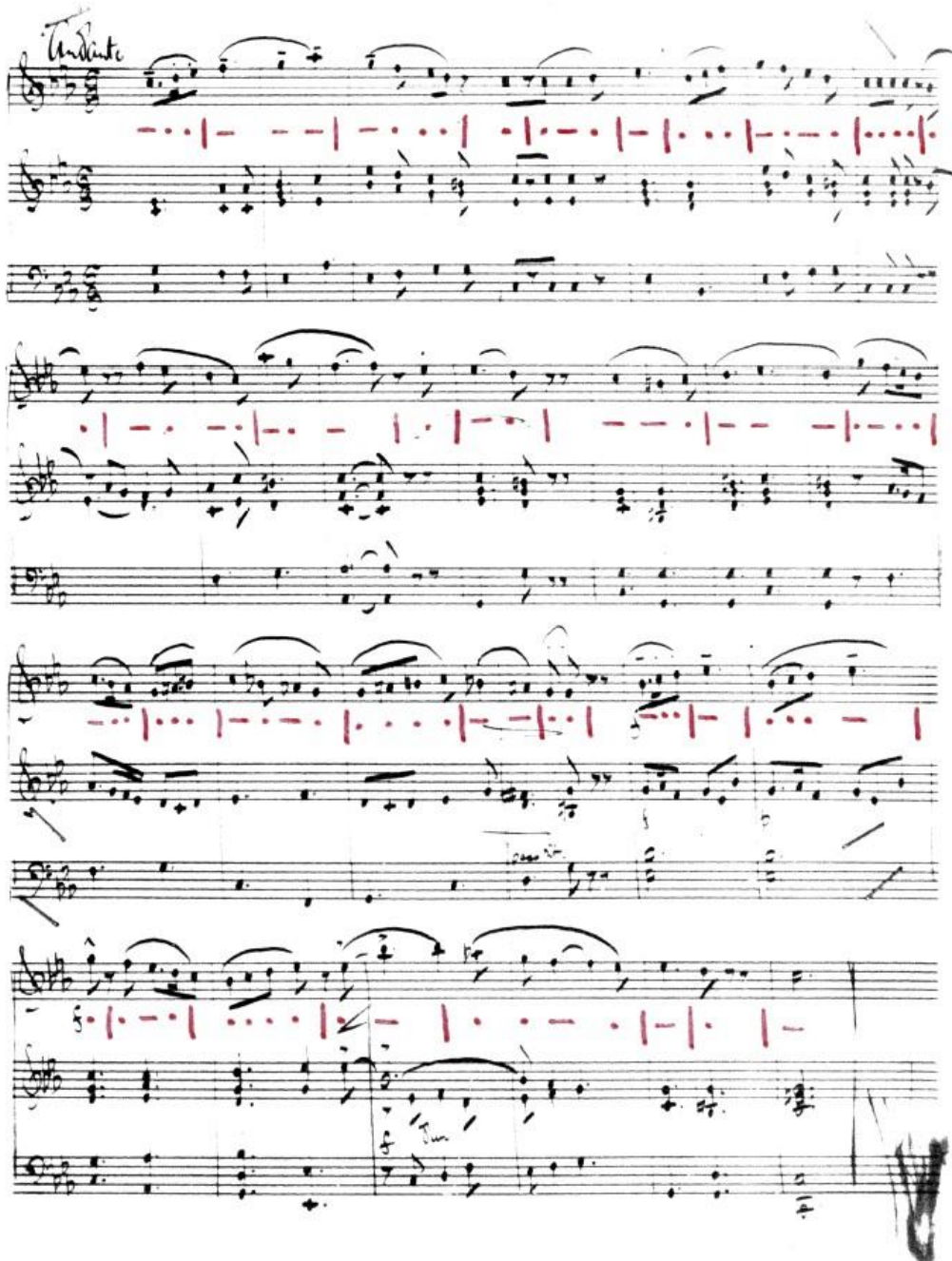
(U)

Example of Morse in Music (full score).

502 caption: a musical score for treble instrument and piano. Underneath the melody, combinations of notes are grouped into Morse code characters.

If you know Morse and would like to try your hand at breaking out the solution, observe how the musical note values have been replaced with Morse dots and dashes according to the two following rules, as illustrated in the manual. Or, if you don't know Morse, you could try solving as a simple substitution; it may be difficult only because of the brevity of the message. The answer appears below the author and source lines at the end of this article. (Final hint: not in English!)

- These values are "short": eighth note or shorter (any note with a "flag" or "bar" at the top or bottom of the stem, unless that note also is followed by a written dot)

- These values are "long": notes longer than an eighth note (any note without a flag or bar, and also flagged or barred notes followed by a written dot)

For example, as the manual points out,
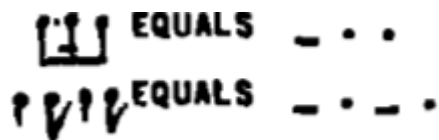
502 caption : two examples of series of notes converted to Morse dots and dashes.

The manual gives an additional hint at how the encipherment would have been developed: "Melody constructed on quantities used to form Morse characters." As always, the cryptographer would have started with the plain text. The first step would have been to compose a melody with note durations satisfying the above rules for forming Morse characters. After that, the piano accompaniment would have been added, complete with performance markings to help ease the message past the censors. Voila -- Ode to Morse!

Solution: Dobert Schicken, Goldschmidt Verhaftet ("send Dobert, Goldschmidt arrested").